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REVIEWS

Preliminary Description of the Geology and Water Resources of the Southern half of the Black Hills and Adjoining Regions in South Dakota and Wyoming. By N. H. DARTON. [Extract from the Twenty-first Annual Report of the U. S. Geol. Surv., 1899–1900, Pt. IV, Hydrography; pp. 489–599; Plates LVIII–CXII; Washington, 1901.]

THE topics discussed in this paper are topography, stratigraphic-geology, geologic structure, geologic history, water resources, minerals, soils, climate and timber. The Black Hills rise out of the Great Plains as a small group of forest covered mountains several thousand feet high. Their central area, composed of mountains and parks, is of crystalline schists and granites. Bordering the old rocks is a belt of limestone plateaus surrounded in turn by the Red Valley, a depression resulting from the etching out of a layer of softer rock — the Spearfish formation of Triassic age. Beyond the valley and concentric with it is the hogback range, due to a hard sandstone not weathered down. Still farther outward are the Plains. Careful descriptions of the lithologic characters and the distribution of each formation follow; in fact the paper is descriptive rather than theoretic, but does not fail to call attention to broad features and to make generalized statements.

The oldest sediments are Cambrian. They are probably of later Cambrian time and give one more item of evidence leading to the conclusion that Cambrian time was one of extensive submergence. Here Cambrian sands were deposited along seashores and in estuaries with gradual submergence and probable ultimate covering of the crystallines with sediments of this age. The chief evidence is the presence of fine grained deposits in the Upper Cambrian such as are not formed near land. At present no Silurian or Devonian strata occur. The reason is problematic. Either there was no deposition or else little deposition and subsequent removal. Carboniferous time began with deep water and marine conditions, and was consummated after the laying down of 800–1000 feet of rock. Triassic and Jurassic are both present and distinguishable because an abrupt change in the character of the sediments and some erosion occur at the top of the former. Cretaceous sediments have accumulated to the thickness of about 6000 feet and consist largely of shales with some sandstone and a little limestone. Tertiary rocks represented by the White River formation are mostly of clay; fuller's earth, sand, limestone, and grits occur. Still later deposits are classed under earlier and later Pleistocene beds.

The structure of the region is that of an elongated low dome with anticlinal wrinkles or spurs running off from the central area. The maximum uplift was north of Harney's Peak and amounted to 9000 feet.

One of the most admirable features of this paper is the abundance of real geographic material embodied in it. The region described is one of submaturely dissected, domed mountains in which all the sediments have been removed from the central portion leaving subdued hills and broad parks of crystalline rocks. The concentric arrangement of the different formations is due to the uplift and to the processes of erosion which though similar for all strata, have been much more effective in reducing some than others. Soft layers are found etched out, hard layers standing up, but each and every one has its peculiar forms. Thus geography follows stratigraphy.

Attempts by the author, more or less successful, to reconstruct the geography of the locality at different periods and to follow it through its phases, are persistently made, and they yield an interesting element in the work. In this connection there is a contour map showing the present relief of the upper surface of the Dakota sandstone over a part of the area. This kind of work forms a very desirable feature.

The considerable eastward dip away from the Black Hills, where most of the formations outcrop, together with other necessary features, gives good artesian conditions to this region. Many wells reaching the Dakota and Lakota sandstones flow with good water. The scanty rainfall on the plains eastward renders these wells very useful. Many streams diminish or cease by sinkage when they cross the sands. Along Cheyenne and Fall rivers there is some opportunity for irrigation — good bottom lands and reservoir space, with fair water supply.

Soils are mostly residuary from underlying rocks. Overplaced soils and sand dunes are found in places. "Sedentary soils" may be criticised. No soil is sedentary in the sense that it does not move. "Soil in place" or preferably "residual soil" more adequately carries the meaning. The relation of soils to underlying rocks, and of crops to soils make very instructive points. Considerable mineral wealth is found in coal, gypsum, and lithographic limestone in large slabs. These of sufficient size to be valuable are not obtainable elsewhere in the United States.

The notes and diagrams on climate are good but disappointing because they do not indicate the significance of the condition of the meteorologic elements from a geologic point of view. There is little utility in giving space in a geologic report to climatic notes unless some use is made of them. The climate must have characteristic influence on erosion, soil formation, soil transportation, etc. The position of volcanic ash to the eastward of the volcanoes, now extinct, just west of the Black Hills shows similarity of winds in the White River time to those of the present time.

Why cannot the U. S. G. S. reports, in discussing such a region as this, have a section on geography? It should embrace most if not all of the section here devoted to topography, but should go farther with the question, incorporating some that is said under soils, climate, water resources, etc., and then discuss the influence of relief, soil and water on products, transportation, distribution of plants and animals, man, and his various occupations.

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The High Plains and Their Utilization. By WILLARD D. JOHNSON. [Extract from the Twenty-first Annual Report of the U. S. Geol. Surv., 1899–1900, Pt. IV, Hydrography; pp. 601–768; Plates CXIII–CLVI.]

THE High Plains, as defined in the first chapter, correspond approximately to the Central Plains. They form a belt extending from central Texas northward across Oklahoma and western Kansas into Nebraska, but are more characteristic in Texas because less eroded. By topographic difference they constitute a topographic unit of the great geographic unit — the Great Plains. The High Plains practically have no drainage, hence their surface is in general a dead level known locally as the "Flats."

Chapter II discusses the origin of these plains. They are the